TYLKINA, M.A.; TYSYGANOVA, I.A.; SAVITSKIY, Ye.M.

Phase diagram of the system tantalum - rhenium. Zhur. neorg. khim. 5 no.8:1905-1905 Ag '60. (MIRA 13:9)

1. Institut metallurgii im. A.A. Baykova, Akademii nauk SSSR.
(Tantalum) (Rhenium)

TYLKINA, M.A.; POVAROVA, K.B.; SAVITSKIY, Ye.M.

Phase diagram of the system vanadium - rhenium. Zhur. neorg. khim. 5 no.8:1907-1910 Ag '60. (MIRA 13:9)

1. Institut metallurgii im. A.A. Baykova Akademii nauk SSSR.
(Vanadium) (Rhenium)

83240

S/129/60/000/009/005/009
E193/E483

9.4174
9.4180 9.2140

AUTHORS: Savitskiy, Ye.M., Doctor of Technical Sciences, Professor, Tylkina, M.A., Candidate of Technical Sciences, Ipatova, S.I. and Pavlova, Ye.I., Engineers

TITLE: The Properties of Tungsten-Rhenium Alloys

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No.9, pp.20-25

TEXT: Following their earlier study of the constitution diagram of the tungsten-rhenium system (Ref.7), the present authors conducted a series of experiments to study the effect of rhenium additions (up to 20%) on various properties of tungsten. All tests were conducted on wire specimens, prepared by powder metallurgy technique. The following conclusions were reached: 1) The temperature of the beginning of recrystallization of tungsten was raised by 200 to 400°C by addition of rhenium, depending on the precise quantity added; 2) Strength and plasticity of tungsten, in the 20 - 3000°C temperature range, are increased by rhenium additions; 3) A wire, made of tungsten-rhenium alloy, is characterized by high strength and plasticity after annealing at 1400 to 1950°C. An alloy, containing 20% rhenium

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The Properties of Tungsten-Rhenium Alloys

and annealed at 1400 to 1500°C has U.T.S. equal 180 to 190 kg/mm$^2$ and elongation of 18 to 20%; 4) Hardness of tungsten-rhenium alloys at 20 - 1000°C is also higher than that of pure tungsten, the hardness of the alloys with more than 10% rhenium at 800°C is 200 kg/mm$^2$ against 110 kg/mm$^2$ for alloys containing less than 10% rhenium; 5) The electrical resistivity of tungsten at various temperatures is increased several times by addition of rhenium; 6) The results of the present investigation indicate that the tungsten-rhenium alloys can be used in the manufacture of various parts of vacuum tubes, thermocouples and electrical contacts. There are 5 figures and 10 references: 6 Soviet, 2 English and 2 German.

ASSOCIATION: Institut metallurgii AN SSSR, Moskovskiy elektrolampoviy zavod (Institute of Metallurgy AS USSR, Moscow Electric Lamp Plant)

Card 2/2

PHASE I BOOK EXPLOITATION SOV/4164

Vsesoyuznoye soveshchaniye po splavam redkikh metallov. 1st, Moscow, 1957

Redkiye metally i splavy; trudy... (Rare Metals and Alloys; Transactions of the First All-Union Conference on Rare-Metal Alloys) Moscow, Metallurgizdat, 1960. 438 p. 3,150 copies printed.

Sponsoring Agencies: Akademiya nauk SSSR. Institut metallurgii; USSR Komissiya po redkim metallam pri nauchno-tekhnicheskom komitete.

Ed.: I.K. Shapovalov; Ed. of Publishing House: O.M. Kamayeva; Tech. Ed.: P.G. Islent'yeva.

PURPOSE: This collection of articles is intended for metallurgical engineers, physicists, and workers in the machine-building and radio-engineering industries. It may also be used by students of schools of higher education.

COVERAGE: The collection contains technical papers which were presented and discussed at the First All-Union Conference on Rare-Metal Alloys, held in the Institute of Metallurgy, Academy of Sciences USSR in November 1957. Results of investigations of rare-metal alloys, titanium, and copper-base alloys with additions of rare metals are presented and discussed along with investigations of rhenium, vanadium, niobium, and their alloys. The effect of rare-earth metals on properties of magnesium alloys and steels is analyzed. The uses of rhenium as a dehydrating catalyst, electroplating material, and material suitable for making plugs for automobile electrical systems are discussed. Also, the effect of the addition of certain elements on the properties of heat-resistant steel is examined and alloys with special physical properties (particularly semiconductive alloys) are discussed. No personalities are mentioned. Soviet and non-Soviet references accompany some of the articles.



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14

Tylkina, M. A.

S/078/60/005/008/014/018
B004/B052

AUTHORS: Tylkina, M. A., Tsyganova, I. A., Savitskiy, Ye. M.

TITLE: Phase Diagram of the System Tantalum - Rhenium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 8, pp. 1905-1907

TEXT: The phase diagram depicted in Fig. 1 was obtained by means of a determination of the fusing temperature, microscopic and radiographic analyses and measurement of the hardness of the structural components. The initial substances were tantalum foil (99.9% of Ta) and bricketed rhenium powder (99.8% of Re) at 1600°C. 18 alloys were produced in argon atmosphere in the arc furnace at 200 torr and remelted several times. The ground faces (Fig. 2) were etched with an aqueous solution of $NH_4F + HCl + HF + HNO_3$, and the microhardness of the components was determined. The X-ray pictures of pulverized alloys were taken by means of Cu-, Ni- and V-radiation. Two chemical compounds developed by peritectic reaction, a wide range of solid solutions on the tantalum side,

Card 1/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757720003-9"

Phase Diagram of the System Tantalum - Rhenium

S/078/60/005/008/014/018
B004/B052

and low solubility on the rhenium side were determined in the system. Structure, lattice constants, and ranges of $\chi$- and $\sigma$-phases, and the two-phase range of $\sigma + \chi$ are described. There are 2 figures and 7 references: 4 Soviet, 1 US, 1 British, and 1 Polish.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

SUBMITTED: February 17, 1960

Card 2/2

Tylkina, M.A.

S/078/60/005/008/015/018
B004/B052

AUTHORS: Tylkina, M. A., Povarova, K. B., Savitskiy, Ye. M.

TITLE: Phase Diagram of the System Vanadium - Rhenium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 8, pp. 1907-1910

TEXT: The phase diagram depicted in Fig. 1 was determined by means of a measurement of the melting temperatures, microscopic and radiographic analyses, measurement of the hardness of the alloys and the micro hardness of the components. The initial substances were V and Re powder fused together in an arc furnace. The melting temperature was determined by means of an optical pyrometer calibrated according to the pure metals. The hardness was measured according to Vickers with a ПМТ-3 (PMT-3) apparatus. The X-ray pictures were taken with an РКД (RKD) camera. In Fig. 2 the microstructures of V-Re alloys are depicted, and a Table gives the analytical data and hardnesses. An exact description of ranges, lattice constants, and physical data of the new σ-phase ($VRe_3$)

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Phase Diagram of the System Vanadium - Rhenium

S/078/60/005/008/015/018
B004/B052

which is only stable above 1500°C are given, and also the ranges of the solid solutions, α- and β-phases, α+β eutectic, and the twophase ranges of α+σ and σ+β. There are 2 figures, 1 table, and 2 references: 1 Soviet and 1 US.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

SUBMITTED: February 17, 1960

Card 2/2

L 43136-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6027747 SOURCE CODE: UR/0370/66/000/004/0116/0122

AUTHOR: Savitskiy, Ye. M. (Moscow); Tylkina, M. A. (Moscow); Khamidov, O. Kh.

ORG: none

38
B

TITLE: Scandium-rhenium system

SOURCE: AN SSSR. Izvestiya. Metally, no. 4, 1966, 116-122

TOPIC TAGS: scandium ~~[illegible]~~ compound, ~~scandium~~ rhenium containing alloy, alloy phase diagram, alloy ~~phase~~ composition, ~~alloy structure,~~ ~~alloy~~ metal property

ABSTRACT: A phase diagram of the scandium-rhenium system (Fig. 1) has been plotted on the basis of data obtained by physicochemical analysis of 13 alloys containing 0 to 100% rhenium, melted from sintered 99.98%-pure rhenium and distilled 99.4—99.6%-pure scandium. The diagram is of the peritectic type with two intermetallic compounds, $ScRe_2$ and $Sc_5Re_{24}$, and limited solubility of components. The solubility of Sc in Re is approximately 2% Sc at peritectic temperature and decreases insignificantly at lower temperatures. The $Sc_5Re_{24}$ compound has a cubic lattice with a constant a = 9.6448 Å and a microhardness of 1225 kg/mm$^2$. The $ScRe_2$ compound of the Laves type has a hexagonal, close-packed lattice

Card 1/2 UDC: 669.793'849

L 43133-66

ACC NR: AP6027747

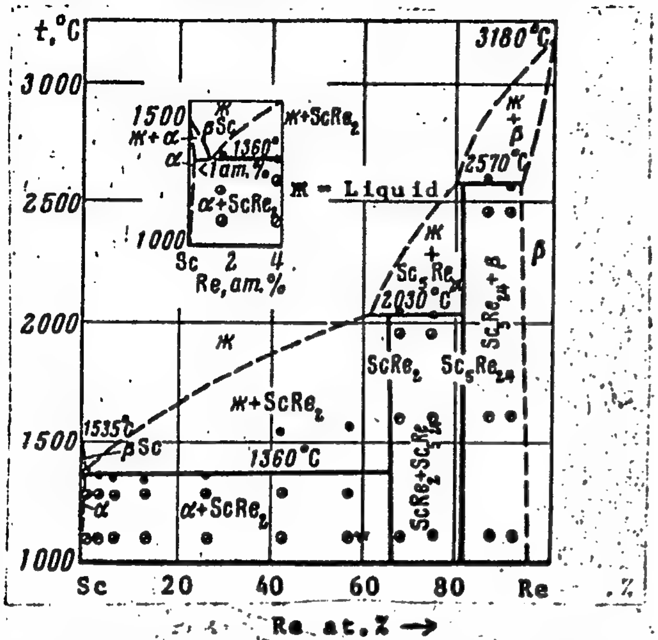


Fig. 1. Phase diagram of the Sc-Re system.

with constant a = 5.270 Å, and a microhardness of 930 kg/mm$^2$. Scandium-base solid solution and $ScRe_2$ compound form a eutectic at 1360C which contains approximately 1% Re. Orig. art. has: 2 figures and 2 tables. [WW]

SUB CODE: 11/ SUBM DATE: 06Oct64 ORIG REF: 009/ OTH REF: 002

5062

Card 2/2 MLP

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757720003-9"

TYLKINA, M.A.; POLYAKOVA, V.P.; SHEKHTMAN, V.Sh.

System iridium - tungsten. Zhur. neorg. khim. 8 no.11:2549-2555 N '63. (MIRA 17:1)

TYLKINA, M.A.; POLYAKOVA, V.P.; SAVITSKIY, Ye.M.

System palladium - tungsten - rhenium. Zhur. neorg. khim. 9 no.3:671-673 Mr '64. (MIRA 17:3)

TYLKINA, M.A.; TSYGANOVA, I.A.

Properties of palladium-rhenium alloys. Zhur. neorg. khim. 8 no.10:2346-2350 O '63. (MIRA 16:10)

(Palladium-Rhenium alloys)

TYLKINA, M.A.; POVAROVA, K.B.

Second All-Union Conference on Rhenium. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.2:174-176 Mr-Ap '63. (MIRA 16:10)

L 18518-63

ACCESSION NR: AP3000919 S/0279/63/000/002/0174/0176

45

AUTHORS: Tylkina, M. A.; Povarova, K. B.

TITLE: Second All-Union conference on rhenium

SOURCE: AN SSSR. Izv. otd. tekh, nauk. Metallurgiya i gornoye delo, no. 2, 1963, 174-176

TOPIC TAGS: rhenium

ABSTRACT: The Second All-Union Conference on Rhenium was held in Moscow on November 19-21, 1962. The conference was organized by the Institut metallurgii im. A. A. Baykova (Institute of Metallurgy) and by the Gosudarstvenny*y institut redkikh metallov (Goskomitet SM SSSR po chernoy i tsvetnoy metallurgii) [State Institute of Rare Metals (Goskomitet SM SSSR of Ferrous and Nonferrous Metallurgy)]. The First Conference on Rhenium was held in Moscow in 1958, and the International Symposium on Rhenium was held in Chicago in 1960. At the second conference 64 papers pertaining to the sources, extraction, properties, and uses of rhenium were presented. Authors and subjects of these papers are listed.

ASSOCIATION: none

Card 1/2

SAVITSKIY, Ye.M.; TYLKINA, M.A.; ZHDANOVA, L.L.; ZUBKOVA, L.A.; STARKOV, V.N.;
FOKIN, A.G.; PETROVA, L.S.; ARKUSHA, T.I.

Investigating the properties of rhenium and rhenium alloys with tungsten and molybdenum. Issl. po zharopr. splav. 9:194-203 '62.
(MIRA 16:6)

(Rhenium--Testing)

PEKAREV, A.I.; SAVITSKIY, Ye.M.; TYLKINA, M.A.

Interaction of lithium with titanium at high temperatures.
Trudy Inst. met. no.12:189-192 '63. (MIRA 16:6)

(Diffusion coatings)
(Titanium—Metallography)
(Lithium—Thermal properties)

T'LKINA, M.A.; TSYGANOVA, I.A.; SAVITSKIY, Ye.M.

Phase diagrams of rhenium alloys with platinum metals (rhocium, palladium, iridium). Zhur. neorg. khim. 7 no.8:1917-1927 Ag '62. (MIRA 16:6)

(Rhenium alloys) (Platinum metals)

POVAROVA, K.B.; TYLKINA, M.A.

Properties and use of rhenium. Biul.tekh.-ekon.inform.Gos.nauch.-issl.inst.nauch.i tekh.inform. no.9:7-11 '63. (MIRA 16:10)

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SAVITSKIY, Ye.M.; TYLKINA, M.A.; TEREKHOVA, V.F.

Effect of temperature on the mechanical properties of granium.
Trudy Inst. met. no.11:133-142 '62. (MIRA 16:5)
(Uranium--Testing) (Metals, Effect of temperature on)

TYLKINA, M.A.; POLYAKOVA, V.P.; KHAMIDOV, O.Kh.

Phase diagram of the system palladium - osmium. Zhur.neorg.khim. 8 no.3: 776-770 Mr '63. (MIRA 16:4)

(Palladium-osmium alloys)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757720003-9"

SAVITSKIY, Ye.M.; TYLKINA, M.A.; POLYAKOVA, V.P.

Phase diagram of the system ruthenium - rhenium - osmium.
Zhur.neorg.khim. 8 no.1:146-418 Ja '63. (MIRA 16:5)
(Ruthenium-rhenium-osmium alloys)

TYLKINA, M.A.; POVAROVA, K.B.

Second All-Union Conference on Rhenium. TSvet. met. 36 no.4: 92-93 Ap '63. (MIRA 16:4)

(Nonferrous metal industries—Congresses)
(Rhenium)

SAVITSKIY, Ye.M.; ~~TYLKINA, M.A.~~; TSYGANOVA, I.A.; GLADYSHEVSKIY, Ye.I.; MULYAVA, M.P.

Phase diagram of the hafnium - rhenium system. Zhur.neorg.khim. 7 no.7: 1608-1610 Jl '62. (MIRA 16:3)

1. Institut metallurgii imeni A.A.Baykova i L'vovskiy gosudarstvennyy universitet imeni I.Franko.
(Hafnium-rhenium alloys)

TYLKINA, M. A.

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The Second All-Union Conference on Rhenium, sponsored by the Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences USSR, and the State Institute of Rare Metals, was held in Moscow 19-21 November 1962. A total of 335 representatives from 83 scientific institutions and industrial establishments participated. Among the reports presented were the following: autoclave extraction of Re from Cu concentrates (A. P. Zelikman and A. A. Peredereyev); Re extraction from the gaseous phase (V. P. Savrayev and N. L. Peysakhov); recovery of Re by sorption and ion interchange (V. I. Bibikova, V. V. Il'ichenko, K. B. Lebedev, G. Sh. Tyurekhodzhayeva, V. V. Yermilov, Ye. S. Raimbekov, and M. I. Filimonov); production of carbonyl Re (A. A. Ginzburg); electrolytic production of high-purity Re and electroplating with Re (Z. M. Sominskaya and A. A. Nikitina); Re coatings on refractory metals produced by thermal dissociation of Re chlorides (A. N. Zelikman and N. V. Baryshnikov); plastic deformation and thermomechanical treatment of Re (V. I. Karavaytsev and Yu. A. Sokolov); growth of Re single crystals and effect of $O_2$ on their properties (Ye. M. Savitskiy and G. Ye. Chuprikov); Re-Mo, Re-W, and Re—precious-metal alloys (Ye. M. Savitskiy, M. A. Tylkina, and K. B. Povarova); synthesis of Re nitrides, silicides, phosphides, and selenides (G. V. Samsonov, V. A. Obolonchik, and V. S. Neshpor); weldability of Re-Mo and Re-W alloys (V. V. D'yachenko, B. P. Morozov, and G. N. Klebanov); new fields of application for Re and Re alloys (M. A. Tylkina and Ye. M. Savitskiy); and Re-Mo alloy for thermocouples (S. K. Danishevskiy, Yu. A. Kocherzhinskiy, and G. B. Lapp). [WW]

Tsvetnyye metally, no. 4, Apr 1963, pp 92-93

TYLKINA, M.A.(Moskva); POVAROVA, K.B.(Moskva); SAVITSKIY, Ye.M.(Moskva)

Recrystallization and mechanical properties of alloys in the system tungsten - molybdenum - rhenium. Izv. AN SSSR.Otd.tekh.nauk. Met. i topl.181-186 S-O '62. (MIRA 15:10)
(Tungsten-molybdenum-rhenium alloys—Testing)
(Crystallization)

AID Nr. 982-13 4 June

EFFECT OF TEMPERATURE ON MECHANICAL PROPERTIES OF URANIUM (USSR)

Savitskiy, Ye. M., M. A. Tylkina, and V. F. Terekhova. IN: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Trudy, no. 11, 1962, 133-142. S/509/62/000/011/010/019

Mechanical properties of hot-rolled uranium (99.7% U and 0.26-0.25% C) have been tested at -196° to 1100°C. Uranium hardness was found to drop from 4?2 kg/mm$^2$ at -196°C to 21 kg/mm$^2$ at 800°C. The temperature coefficient of hardness for $\alpha$-uranium was found to be 0.9·10$^{-3}$. Cold working with 5?% reduction increases the room temperature hardness by 70 kg/mm$^2$. The ductility of uranium increases and its resistance to deformation decreases with increasing temperature. In upsetting at 50 mm/min, cylindrical specimens 9.8 mm in diameter and 15 mm long can withstand 33% reduction at 20°C, 6? to 75% at 500 to 600°C, and 97% at 850°C. To obtain a reduction of 10% at

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EFFECT OF TEMPERATURE [Cont'd]

S/509/62/000/011/010/019

100°C a stress of 90 $kg/mm^2$ is needed, but only 1 $kg/mm^2$ at 800°C. The
tensile strength at room temperature was found to be 82 $kg/mm^2$, [illegible]
2%, and the reduction of area, 4%. With increasing temperature the tensile
strength decreases continuously, elongation and reduction first [illegible]
somewhat at 760°C, reach a maximum (~ 35% elongation, and 100% reduction [illegible]
of area, at ~ 1000°C, and then drop sharply. The notch toughness of uranium
at room temperature is low (1.7 $kg\cdot m/cm^2$); it rises to 7.3 at 600°C, drops
to 0.5 at 750°C, and increases to ~ 12 $kg\cdot m/cm^2$ at ~ 850°C. The latter in-
crease proves the high ductility of $\gamma$-uranium. The same temperature de-
pendence is observed in impact upsetting: with a single hammer blow the
specimens can be upset, without cracks, by 80% at 800° C and by 99.7% at
1000° C, [illegible] by only 9.5% at 700° C. These results confirm the existence of
the three allotropic transformations which uranium undergoes with increas-
ing temperature, with the $\alpha$-phase having a medium ductility, the orthorhom-
bic $\beta$-phase a very low ductility, and the cubic $\gamma$-phase a very high ductility.

[ND]

TYLKINA, M. A.

Rhenium as a metal of the new technology. Priroda 52 no.1: 111-112 '63. (MIRA 16:1)

1. Institut metallurgii im. A. A. Baykova, Moskva.

(Rhenium)

D'YACHENKO, V.V., kand.tekhn.nauk; MOROZOV, B.P., inzh.; TYLKINA, M.A., kand.tekhn.nauk; SAVITSKIY, Ye.M., doktor khim.nauk; Prinimali uchastiye: VINOKUROV, V.P.; BIRYUKOVA, L.V.

Welding molybdenum with an addition alloying of the weld metal by rhenium. Svar.proizv. no.7:1-4 Jl '62. (MIRA 15:12)

1. Moskovskiy aviatsionnyy tekhnologicheskiy institut (for D'yachenko, Morozov). 2. Institut metallurgii im. A.A.Baykova (for Tylkina, Savitskiy).

(Molybdenum--Welding) (Rhenium)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; CHUPRIKOV, G.Ye.

Effect of metallic impurities on the physicomechanical properties of rhenium. Zhur.neorg.khim. 7 no.9:2272-2274 S '62.

(MIRA 15:9)

(Rhenium) (Metals)

TYLKINA, M.A.; POLYAKOVA, V.P.; SAVITSKIY, Ye.M.

Phase diagram of alloys of the osmium - ruthenium system. Zhur.-neorg.khim. 7 no.6:1467-1468 Je '62. (MIRA 15:6)
(Osmium-ruthenium alloys)

1

TYLKINA, M.A.; POLYAKOVA, V.P.; SAVITSKIY, Ye.M.

Phase diagram of the osmium - rhenium system. Zhur.neorg.khim. 7 no.6:1469-1470 Je '62. (MIRA 15:6)
(Osmium-rhenium alloys)

TYLKINA, M.A.; POLYAKOVA, V.I.; SAVITSKIY, Ye.M.

Phase diagram of the palladium - iridium system. Zhur.neorg.khim. 7 no.6:1471-1473 Je '62. (MIRA 15:6)
(Palladium-iridium alloys)

SAVITSKIY, Ye.M., doktor khim.nauk, prof.; SOL'TS, V.A., inzh.; TYLKINA, M.A., kand.tekhn.nauk

Effect of rhenium on the properties of cobalt-chromium-nickel alloys. Metalloved. i term. obr. met. no.6:10-13 Je '62. (MIRA 15:7)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii i Institut metallurgii im. A.A. Baykova.
(Cobalt-chromium-nickel alloys—Testing) (Rhenium)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; POLYAKOVA, V.P.

Phase diagram of alloys of the ruthenium - rhenium system. Zhur. neorg.khim. 7 no.2:439-441 F '62. (MIRA 15:3)
(Ruthenium-rhenium alloys) (Phase rule and equilibrium)

40990

18.1152

S/659/62/009/000/027/030
I003/I203

AUTHORS Savitskiy, Ye. M., Tylkina, M. A., Zhdanova, L. L., Zubkova, L. A., Starkov, V. N., Fokin, A. G., Petrova, L. S., and Arkusha, T. I.

TITLE: The properties of rhenium, rhenium-tungsten and rhenium-molybdenum alloys

SOURCE Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam v. 9. 1962. Materialy Nauchnoy sessii po zharoprochnym splavam (1961 g.), 194–203

TEXT: Modern technology demands the most refractory metals such as W, Re, Ta and Mo. In the present work the microstructure and the mechanical properties of Re—W and Re—Mo were investigated at room and at 2600°–3400°C. Methods of casting and of plastic deformation of W—Re, Mo—Re and W—Mo—Re alloys were developed. It was shown that when tungsten and molybdenum are alloyed with rhenium there is an increase in plasticity in machinability in weldability and in strength, and the temperature of recrystallization increases by 400–500°C. There are 4 figures and 1 table.

X

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20460

S/109/62/007/009/009/018
D409/D301

26.2531

AUTHORS: Dyubua, B.Ch., Pekarev, A.I., Popov, B.N., and Tylkina, M.A.

TITLE: Thermionic emission of tungsten-titanium and tungsten-hafnium alloys and its dependence on oxygen pressure

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 9, 1962, 1566 - 1573

TEXT: The dependence of the work function of W-Ti and W-Hf alloys on their composition was investigated. It was found that the work function of solid solutions is lower than that of pure metals. Solid solutions and chemical compounds should be considered as new emitters whose properties differ from the properties of pure metals. As the original materials, tungsten powder of grade ВЧ (VCh) (highly pure) was used, titanium of grade ИМП-1А (IMP-1A), and chemically-pure hafnium. The composition of the alloys was determined by chemical analysis. The alloys underwent X-ray structural and metallographic analysis. The lattice parameters of the solution of hafnium in tungsten were calculated; it was found that the value of

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D409/D301

Thermionic emission of ...

the lattice parameter increases from 3.160 to 3.185 KX. The thermionic emission of the alloys was measured by means of an experimental lamp. For the W-Ti alloys, three values of the work function were obtained, in addition to the work functions of the pure metals. These values are roughly similar (3.6 - 3.75 ev). The dependence of the thermionic emission on the oxygen pressure, was investigated for both alloys without Ba-coating and with Ba-coating. In the first case, the behavior of the alloys is as follows: 1) If the oxygen pressure is increased, the thermionic emission changes in the same way as that of the low melting-point component; 2) the critical oxygen pressure is higher for the alloys (at equal temperatures), than for pure tungsten, but lower than that of the component metals. In the case of Ba-coated alloys, the following qualitative results were obtained from the experiments: 1) Under the action of the oxygen, the emission of the alloys initially increases, and then decreases (similar to the emission of tungsten); but the increase in emission is several hundredfold less than that of tungsten. 2) In the case of the alloys, the drop in emission starts at higher oxygen pressures than for pure tungsten, but at lower pressures than for pure titanium and hafnium. The authors also calcula-
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Thermionic emission of ... S/109/62/007/009/009/018
D409/D301

ted the work functions of the alloys. The calculated and experimental values were in good agreement. A formula was derived, connecting the change in the lattice parameter a of the solid solution, with the work function:

$$W_a = c \frac{e^2}{2a} . \qquad (2)$$

This formula is qualitatively correct for the system W-Hf, but it does not hold for the system W-Ti. It is concluded that the work function of solid solutions of metals is lower than that of the pure metals; this difference is in some cases ∿1 ev. The drop in thermionic emission of the alloys, due to the oxygen, is intermediate to that of the components and entirely disappears at temperatures at which the emission attains a magnitude which is of interest in practice. The process of poisoning of the alloys cannot be explained by assuming that the processes of chemisorption, oxidation and evaporation on the individual atoms, are independent. There are 5 figures and 1 table.

SUBMITTED: December 29, 1961

Card 3/3

S/137/62/000/006/140/163
A057/A101

AUTHORS: Sominskaya, Z. M., Nikitina, A. A., Tylkina, M. A., Sklyarenko, S. I., Savitskiy, Ye. M.

TITLE: Galvanic coatings with rhenium-nickel, rhenium-cobalt, and rhenium-nickel-chromium alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 93, abstract 6I590 (V sb. "Reniy". Moscow, AN SSSR, 1961, 209 - 213)

TEXT: Cu- and Cr-Ni-rods were plated electrolytically with coatings from Re-alloys. Optimum conditions are given for the plating with the alloys Re-Ni, Re-Cr, and Re-Co. The galvanic coatings Re-Ni (19 - 86% Ni), Re-Co (19 - 32% Co), Re-Cr (up to 1% Cr), and coatings with the ternary alloy Re-Ni-Cr were investigated microscopically: the thickness of the layer and its hardness was determined. For the first time were obtained dense coatings with the ternary alloy Re-Ni-Cr, containing 13.3% Ni and 5.4% Cr, on Cu- and Cr-Ni base by conducting the electrolysis in the following conditions. Composition of the electrolyte (in g/l): $KReO_4$ 50, $CrO_3$ 20, $NiSO_4$ 100, $H_2SO_4$ 75, $(NH_4)_2SO_4$ 40;

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Galvanic coatings with... S/137/62/000/006/140/163
A057/A101

$D_c$ 100 a/dm2, temperature of the electrolyte 75°C. There are 7 references.

Ye. Layner

[Abstracter's note: Complete translation]

Card 2/2

S/129/62/000/006/002/008
E193/E483

AUTHORS: Savitskiy, Ye.M., Doctor of Chemical Sciences, Professor, Sol'ts, V.A., Engineer, Tylkina, M.A., Candidate of Technical Sciences

TITLE: The effect of rhenium on the properties of a cobalt-chromium-nickel alloy

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no.6, 1962, 10-13 + 1 plate

TEXT: The Co-Cr-Ni alloy К40НХМ (K40NKhM) is used as a material for those parts of electrical measuring instruments which must be anti-magnetic and have high hardness and good corrosion and wear resistance. In some cases, hardness higher than that obtained by mechanical and thermal treatment is required and the object of the present investigation was to explore the possibility of achieving this end by alloying with rhenium. The experimental materials were prepared by remelting rods of the K40NKhN alloy with 0.5 to 15% rhenium introduced in the form of sintered powder briquettes. The ingots, 10 to 12 mm diameter, were reduced by

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The effect of rhenium ... S/129/62/000/006/002/008
E193/E483

hot swaging at 1150 - 1180°C to 4.5 - 5.5 mm diameter, and then drawn to 0.5 mm diameter wire in several operations with intermediate annealings, the reduction given in the final operation varying between 50 and 80%. Metallographic examination revealed that the alloy studied could contain up to 10% rhenium in solid solution. All cast alloys had a similar dendritic structure; after hot swaging the rhenium-free specimens consisted of large polyhedral grains with disperse inclusions of a second phase particle. Addition of rhenium brought about considerable grain refinement and formation of twins in swaged specimens, the latter effect being particularly pronounced in alloys with 7 to 10% rhenium. All specimens were solution treated at 1180°C and then aged at various temperatures, hardness measurements being taken on each specimen in various stages of the mechanical and thermal treatment. Typical results are reproduced in Fig.2, 3 and 6. In Fig.2, Rockwell hardness (HRB and HRC) is plotted against the rhenium content in the alloys, graphs a, б and в relating to cast, hot-swaged and solution treated material, respectively. In Fig.3, hardness (Rockwell HRC and Vickers HV)
Card 2/~~6~~ 3

The effect of rhenium ... S/129/62/000/006/002/008
E193/E483

of wire specimens, given 80% cold deformation, solution treated and then aged, is plotted against the ageing temperature; various curves relating to specimens with no rhenium (curve 1) and to specimens containing 0.5, 0.8, 3.0, 5.0, 7.0 and 10.0% rhenium (curves 2, 3, 6, 7, 8 and 9 respectively). Finally, hardness (HRC and HV) of aged specimens containing 7% rhenium is plotted against the ageing temperature, various curves relating to wires which in the last drawing operation had been given different reductions, as indicated by each curve. Several conclusions were reached. 1. Addition of rhenium increases the strength of the K40NKhM alloy without reducing its workability or affecting its anti-magnetic and corrosion-resistance properties. 2. Hardness of 60 to 64 HRC and UTS of 260 to 280 kg/mm$^2$ can be attained in an aged alloy containing 7 to 10% rhenium. There are 6 figures.

ASSOCIATION: TsNIIChM
Institut metallurgii im. A.A.Baykova (Institute of Metallurgy imeni A.A.Baykov)

Card 3/~~8~~ 3

KRIPYAKEVICH, P.I.; TYLKINA, M.A.; SAVITSKIY, Ye.M.

Compounds of hafnium with beryllium, their crystal structures and some properties. Zhur.strukt.khim. 2 no.4:424-433 Jl-Ag '61. (MIRA 14:9)

1. L'vovskiy gosudarstvennyy universitet imeni Iv.Franko i Institut metallurgii imeni A.A. Baykova AN SSSR.
(Hafnium-beryllium alloys)

S/078/62/007/006/020/024
B110/B144

AUTHORS: Tylkina, M. A., Polyakova, V. P., Savitskiy, Ye. M.

TITLE: Phase diagram of osmium - ruthenium alloys

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 6, 1962, 1467 - 1468

TEXT: An Os - Ru phase diagram was established for the first time, by determining melting point and hardness and by microstructural and x-ray structural phase analyses. As Os and Ru have hexagonal crystal structures, and their atomic radii differ by no more than 1.51%, of solid solutions were assumed to form in an unbroken series. Os and Ru powders of 99.8% purity were pressed into tablets, sintered at 1200°C in vacuo, then melted in an evacuated electric arc furnace under a helium pressure of 200 - 250 mm Hg. Cast samples annealed at 2000°C for 1 hr and at 1000°C for 500 hrs were used for the phase analyses. Ground sections etched in 15% $HNO_3$ using alternating current were used for the micro-structural analysis. Lattice constants and hardness were determined under Cu-$K_\alpha$ radiation and under 5-kg load ( in the Vickers test),

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757720003-9"

S/078/62/007/006/020/024
B110/B144

Phase diagram of...

respectively. Results: (1) Os and Ru form an unbroken series of solid solutions (by substitution). (2) The initial melting point of the alloys decreases continuously from Os to Ru. (3) All cast alloys show dendritic structures throughout their range of concentrations. The annealed alloys have the same polyhedral microstructure as the solid solutions. (4) The solid solutions of the alloys have hexagonal structures only. The lattice constants decrease continuously from Os to Ru. (5) Hardness shows a flattened maximum between 70 and 60% by weight of Os. There are 2 figures and 1 table.

SUBMITTED: January 11, 1962

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S/078/62/007/006/021/024
B110/B144

17 1280

AUTHORS: Tylkina, M. A., Polyakova, V. P., Savitskiy, Ye. M.

TITLE: Phase diagram of osmium-rhenium alloys

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 6, 1962, 1469-1470

TEXT: An Os-Re phase diagram was established for the first time, by measuring melting point and hardness and by microstructural and x-ray structural phase analyses. It was assumed that an unbroken series of solid solutions is formed by substitution as these metals belong among transition metals having incomplete d-shells, they adjoin one another in the periodic system, the have isomorphous crystal structures, and their atomic radii differ but little. Metals of 99.8 % purity were pressed, sintered, and melted in an electric arc furnace under a helium atmosphere at 200-250 mm Hg. Cast samples annealed at 2000°C for 1 hr and at 1000°C for 500 hrs were used for the analyses and measurements. Microsections etched in 15 % $HNO_3$ using alternating current were used for the microstructural analysis. Lattice constants and hardness were determined respectively under Cu-$K_\alpha$ radiation and under 5-kg load (in the Vickers test),

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S/078/62/007/006/022/024
B110/B144

18 1220

AUTHORS: Tylkina, M. A., Polyakova, V. P., Savitskiy, Ye. M.

TITLE: Palladium-iridium phase diagram

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 6, 1962, 1471-1473

TEXT: The Pd-Ir phase diagram was established by measuring the melting point, the microhardness of the phases and the Brinell hardness, and by microstructural and x-ray phase analyses. Pd and Ir have face-centered cubic crystal structures and similar electronegativity (Ir: 2.10; Pd: 2.08); their atomic radii differ by not more than 1.5 %. Metal powders of 99.8 % purity were pressed, sintered in vacuo, and melted in an induction furnace - or, when containing 40-80 % by weight of Ir, in an electric arc furnace - under a helium atmosphere at 200-250 mm Hg. Heat treatment of the samples for the phase analysis: (1) All alloys were quenched from temperatures near their melting points. (2) Alloys containing 40-100 % Ir were quenched from 1600°C in vacuo. (3) All alloys were quenched from 1500°C in vacuo, from 1300°C, 1100°C, 900°C, and 700°C. (4) Annealing followed for 300 hrs at 1000°C, then cooling to 400°C at a

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... weight of Pd at ... solution
... phase is separated, and the

Palladium-iridium phase diagram

S/078/62/007/006/022/024
B110/B144

hardness of an alloy containing 10 % by weight of Pd increases. (7) Two face-centered cubic solid solutions occur in alloys containing 60 and 70 % by weight of Ir when quenched from temperatures near the melting point. There are 2 figures.

SUBMITTED: January 11, 1962

Card 3/3

SAVITSKIY, Ye.M.; TYLKINA, M.A.; POVAROVA, K.B.

Phase diagram of the aluminum - rhenium system. Zhur.neorg.khim. 6 no.8:1962-1965 Ag '61. (MIRA 14:8)

1. Institut metallurgii imeni A.A. Baykova AN SSSR. (Aluminum) (Rhenium)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; KIRILENKO, R.V.; KOPETSKIY, Ch.V.

Phase diagram of the system manganese - rhenium. Zhur.neorg.khim. 6 no.6:1474-1476 Je '61. (MIRA 14:11)

1. Institut metallurgii im. A.A.Baykova AN SSSR.
(Manganese-rhenium alloys)

S/078/62/007/002/017/019
B127/B110

AUTHORS: Savitskiy, Ye. M., Tylkina, M. A., Polyakova, V. P.

TITLE: Phase diagram of the ruthenium - rhenium melt

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 2, 1962, 439 - 441

TEXT: The existence of a continuous series of solid solutions in all concentrations is assumed on the basis of the vicinity of Ru and Re in the periodic system, the similarity of their radii, and isomorphy of the crystal structure. This assumption was confirmed by experiments. Various specimens, cast and thermally treated, were used for the phase analysis. V. S. Shekhtman used cuts for an X-ray diffraction analysis in a РКУ (RKU) chamber by Cu-Kα radiation. This analysis showed the solid solutions to be of hexagonal structure. There are 2 figures, 1 table, and 1 Soviet reference.

SUBMITTED: June 23, 1961

Fig. 1. (a) Phase diagram Ru - Re; (б) dependence of the lattice co ant

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SAVITSKIY, Ye.M.; TYLKINA, M.A.; PEKAREV, A.I.; GAVRILYUK, M.I.; ZABAVNOVA, A.P.

Recrystallization diagram for cast tungsten. Dokl. AN SSSR 140 no.6:1301-1303 O '61. (MIRA 14:11)

1. Institut metallurgii im. A.A.Baykova AN SSSR. Predstavleno akademikom I.V.Tananayevym.

(Tungsten crystals--Growth)

TYLKINA, M.A.; POLYAKOVA, V.P.; SAVITSKIY, Ye.M.

Phase diagram of the system palladium - tungsten. Zhur.neorg.khim. 6 no.6:1471-1474 Je '61. (MIRA 14:11)
(Palladium-tungsten alloys)

to illustrate the changes in the elasticity modulus and yield strength of Re in relation to the temperature; the rate of oxidation of Re; the tension and pressure of Re vapor between 2494 and 5900°K; the influence of the degree of deformation on the mechanical properties of Re; the recrystallization of cast cold-deformed RE; and the hardness of this type of metal after annealing at 1000 - 2400°C. The microstructure of cast metal and of deformed, annealed metal is also discussed. As regards the influence of Re on the recrystallization of metals, graphs show how Ni, Ni-Cr, Ti and W are affected by Re at temperatures from 500 to 1500°C. Factual material is presented about the influence of temperature changes on the mechanical properties of Re, the yield strength of Re and other metals, and the long-term stability of Re, W, Mo and Nb. Then the authors list the various uses of Re and its alloys: 1) as an alloying element to raise the heat stability of metals; 2) in the electrovacuum industry; 3) in thermocouples; 4) as material for electrocontacts; 5) as an emitter; 6) as wear-resisting material; 7) for springs acting at high temperatures; 8) as an alloying ingredient to increase the plasticity of W and Mo; 9) for intensify-

ing combustion in engines; 10) as galvanic coatings; 11) as catalysts. The uses of Re in 1), 2), and 4) are illustrated by means of graphs. These depict, among other things, the effect of Re additions on the strength and plasticity of W wire; the influence of the annealing temperature on the strength of W-Re wire under tension; and the effect of heat changes on the electro-resistance of similar material. There are 17 figures, 6 tables and 25 references: 14 Soviet-bloc and 11 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: E. M. Sherwood et al., J. Electrochem. Soc., 102, no. 11, 650-654 (1955); C. T. Sims et al., J. Metals, sec. 2, 8 (8), 913-917 (1956) and Rev. Scient. Instrum., 30, no. 2, 112-115 (1959); J. M. Pugh, J. Metals, 10 (5), 335-340 (1958).

35091
S/697/61/000/000/017/018
D228/D303

18.1200

AUTHORS: Sominskaya, Z. M., Nikitina, A. A., Tylkina, M. A., Sklyarenko, S. I. and Savitskiy, Ye. M.

TITLE: Galvanic coatings with rhenium-nickel, rhenium-cobalt, rhenium-chromium and rhenium-nickel-chromium alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii im. A. A. Baykova. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. Mezhduvedomstvennaya komissiya po redkim metallam. Vsesoyuznoye soveshchaniye po probleme reniya. Moscow, 1958. Reniy; trudy soveshchaniye. Moscow, Izd-vo AN SSSR, 1961, 209-213

TEXT: In this work the authors prepared stable galvanic coatings of various alloys -- Re-Ni, Re-Co, Re-Cr, Re-Ni-Cr -- and studied their properties. It is stated that, although scientists have obtained galvanic coatings of binary Re alloys, no previous attempt has been made to prepare films consisting of the ternary Re-Ni-Cr alloy. In the tests the coatings were applied to rods of Cu and

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Ni-Cr. The method of L. E. Netherton and W. L. Holt was followed in the preparation of Ni-Re alloy coatings containing 19 - 86% Ni. The experimental procedure is described together with those for the preparation of Re-Co (19 - 82% Co) and Re-Cr ($\ll$1% Cr) coatings. In the case of the ternary alloy, containing 13.3% Ni and 5.4% Cr, the authors electrolyzed material composed of $KReO_4$ 50, $CrO_3$ 20, $NiSO_4$ 100, $H_2SO_4$ 75, and $(NH_4)_2SO_4$ 40 g/l at a temperature of 75°C and a cathode current-density of 100 amp/$dm^2$. The analytical method employed to determine the alloys' composition is also described. The hardness of the coating layers was measured on a ПТМ-3 (PTM-3) instrument with a diamond pyramid under loads of 100, 50, and 20 g. Their thickness was estimated with the help of microphotographic techniques. On the basis of their experimental data, which are given in tables, the authors draw the following conclusions: 1) There is no diffusion pene-tration of Re and its alloys into the surface layer of the base material; 2) the coatings are mostly quite dense, but the layers are not evenly distributed on

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Galvanic coatings with ... S/697/61/000/000/017/018
D228/D303

the surface of the specimens; 3) cracks observed in some coatings were probably formed under the severe machining conditions and high temperatures used to prepare the polished sections; 4) the microhardness determinations only yield tentative information which shows that the coatings are harder than the Cu and Ni-Cr base. There are 2 figures, 2 tables and 7 references: 2 Soviet-bloc and 5 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: C. Joynd, Metal Ind., 34, 176, (1936); L. E. Netherton and W. L. Holt, J. Electrochem. Soc., 98, 106, (1951) and 99, 44, (1952); M. F. Qualey, US Pat. 2739108, (1956).

Card 3/3

SAVITSKIY, Ye.M., doktor khim. nauk, otv. red.; RYABCHIKOV, D.I., doktor khim. nauk, red.; BIBIKOVA, V.I., doktor khim. nauk, red.; TYLKINA, M.A., kand. tekhn. nauk, red.; POVAROVA, K.B., inzh., red.; MAKARENKO, M.G., red. izd-va; SIMKINA, G.S., tekhn. red.

[Rhenium; transactions] Renii; trudy. Moskva, Izd-vo Akad. nauk SSSR, 1961. 278 p. (MIRA 15:1)

1. Vsesoyuznoye soveshchaniye po probleme reniya, 1958. (Rhenium)

29817
S/020/61/140/006/014/030
B104/B102

18.7500

AUTHORS: Savitskiy, Ye. M., Tylkina, M. A., Pekarev, A. I., Gavrilyuk, M. I., and Zabavnova, A. P.

TITLE: Recrystallization diagram of cast tungsten

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 6, 1961, 1301 - 1303

TEXT: By x-ray diffraction studies, microscopic examinations, and hardness measurements (Vickers hardness, 10 kg load) the authors constructed a complete recrystallization diagram of cast tungsten (99.6 %). After casting the specimens were compressed (70 %) and annealed (1600°C). The material had a grain size of 40 - 50 μ. The specimens were compressed from 6 to 90 % with a hammer in a hydrogen atmosphere at 700 - 1100°C. These temperatures are just below the recrystallization temperature of tungsten. After this treatment specimens of each deformation degree were annealed in the range from 1000 to 2500°C at every 100°C for one hour (between 1400 and 1600°C at every 50°C). The specimens were electrolytically polished (10 % NaOH in water, 1.7 a/cm$^2$). The recrystallization

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X/I

29817

Recrystallization diagram of cast ... S/020/61/140/006/014/030 B104/B102

diagram of deformed tungsten is shown in Fig. 1. At deformations between 30 and 90 %, recrystallization sets in at 1450°C. The recrystallization takes place between 1450 and 1600°C. At a temperature of 1700°C, the grains start growing. At 9 % deformation, recrystallization sets in at 1600°C. The critical degree of deformation shifts from 12 % deformation at an annealing temperature of 1600°C to 6 % deformation at an annealing temperature of 2100°C. The coarsest grains were obtained by annealing at 2500°C. With an increase of the degree of deformation from 30 to 90 % hardness increased from 380 $kg/mm^2$ to 440 $kg/mm^2$. When recrystallized grains appear, hardness drops to 360 $kg/mm^2$. The optimum annealing temperature of tungsten deformed by 50 - 90% was assumed to be between 1500 and 1600°C. A comparison with data on high-purity single crystals showed the strong influence of impurities on the recrystallization temperature. There are 1 figure and 4 references: 2 Soviet and 2 non-Soviet. The 2 references to English-language publications read as follows: E. L. Harmon, J. Metals, 12, no. 9 (1960); S. J. Noesen, I. R. Hughes, Trans. Met. Soc., AIME, 218 (1960).

X

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

Card 2/~~4~~ 3

29817

Recrystallization diagram of cast ... S/020/61/140/006/014/030
B104/B102

PRESENTED: June 2, 1961, by I. V. Tananayev, Academician

SUBMITTED: May 31, 1961

Fig. 1. Recrystallization diagram of commercial cast tungsten. Legend: (1) degree of deformation; (2) annealing temperature; (3) mean diameter of grains.

X

Card 3/~~4~~ 3

SAVITSKIY, Ye.M.; TYLKINA, M.A.; IPATOVA, S.I.; PAVLOVA, Ye.I.

Physicomechanical properties of tungsten-rhenium alloys. Trudy Inst. met. no.4:214-229 '60. (MIRA 14:5)
(Tungsten-rhenium alloys--Testing)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; TURANSKAYA, A.M.

Titanium and titanium alloy recrystallization diagrams. Titan i ege splavy no. 1:33-67 '58. (MIRA 14:5)

1. Institut metallurgii AN SSSR.
(Titanium--Metallography) (Crystallization)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; TURANSKAYA, A.N.

Mechanical properties of varying degree purity titanium. Titan i ege splavy no. 1:68-81 '58. (MIRA 14:5)

1. Institut metallurgii AN SSSR.
(Titanium—Metallography) (Deformations (Mechanics))

18.1210 2408 25514 S/078/61/006/008/013/018
B127/B220

AUTHORS: Savitskiy, Ye. M., Tylkina, M. A., Povarova, K. B.

TITLE: Phase diagram of aluminum-rhenium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1962-1965

TEXT: A compound of the type CsCl is known to the authors from the literature: AlRe, a = 2.88Å. The alloys were prepared from 99.8% Re and AB-000 (AV-000), i. e., 99.9% aluminum. The plotting of the diagram is rather difficult, since the weights (Al: 2.7; Re: 21.02), the melting points (Al: 660°C; Re: 3170°C), and the boiling points (Al: 2060°C; Re: 5870°C) are very different. Alloys containing 13.6 - 86.3 % by weight of Re were prepared in an arc furnace with water-cooled tungsten electrodes in an argon atmosphere at a pressure of 400 mm Hg and remelted 4 - 5 times in order to obtain a homogeneous phase. Alloys containing 0 - 6% of Re were fused in an induction furnace with NaCl as flow medium from aluminum and alloys containing 37% of Re in corundum crucibles. Alloys containing 88.5 - 99.6% of Re were fused from rhenium and compounds containing 74.5% of Re in the arc furnace. The melting point of alloys containing 74.5 -

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Phase diagram of... 25514 S/078/61/006/008/013/018
B127/B220

99.6% of Re was determined using the capillary method and an optical pyrometer. The compounds enriched with aluminum were tested with a special device recording the thermogram on heating and cooling by means of a Kurnakov pyrometer. A high-temperature thermocouple W - 3% Re/W - 15% Re was used. Thermal analysis was effected in a vacuum furnace with tungsten heaters and helium atmosphere. Alloys containing 0 - 82.5% of rhenium were tempered in evacuated quartz ampullae for 500 hr at 570°C, and alloys containing 74.5 - 99.6% of Re for 100 hr at 1000°C, for 5.5 hr at 1300°C, and for 1.5 hr at 1600°C and $10^{-4}$ mm Hg. The Brinell hardness of alloys with 0 - 60% of Re was measured with 2.5 mm balls and at a pressure of 31.25 kg. Moreover, the hardness of the alloys was measured by means of a Vickers diamond at a pressure of 10 kg, and with a ПМТ-3 (PMT-3) diamond at pressures of 20 and 50 g. The $\chi$-phase of the diagram corresponds to the α-phase of manganese. The lattice parameter a = 9.85 Å, the space group I43 m- $T_d^3$. The microhardness is 800 kg/mm$^2$. $Al_2Re$ has a microhardness of 1000 kg/mm$^2$. $Al_{12}Re$ has a microhardness of 360 kg/mm$^2$ and the same structure as $Al_{12}W$ or $Al_{12}Mo$ with cubic structure. The lattice parameter a = 7.528 ± 0.001 Å, the space group Lm3-$T_h^5$. There are

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S/078/61/006/008/013/018
B127/B220

Phase diagram of... 25514

2 figures and 4 Soviet-bloc references.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

SUBMITTED: February 17, 1961

X

Card 3/4

24938

18.1215

21.2000

S/192/61/002/004/001/004
D217/D306

AUTHORS: Kripyakevich, P.I., Tylkina, M.A. and Savitskiy,

TITLE: Hafnium-beryllium compounds, their crystal structure and properties

PERIODICAL: Zhurnal strukturnoy khimii, n. 2, no. 4, 1961, 424 - 433

TEXT: The materials used for preparing the alloys were hafnium iodide (impurities: 0.48% Zr; 0.0022% Si; 0.006% Ti; 0.0012% Al; 0.003% Mg; 0.13% Mo) and beryllium (99.3% Be). Beryllium was further purified by repeated melting in a high frequency vacuum furnace under argon at a pressure of 50 mm Hg in BeO crucibles. Beryllium-base alloys containing 0.0025; 0.005; 0.013; 0.025; 0.10; 0.56; 1.24 and 2.44 atomic % Hf (0.05; 0.1; 0.25; 0.5; 2.0; 10.0; 20.0; 33.0 weight %) were also prepared in a high frequency vacuum furnace in BeO crucibles in an argon atmosphere, but the pressure was increased to 100 - 200 mm Hg.

X

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24938

Hafnium-beryllium compounds... S/192/61/002/004/001/004
D217/D306

Hafnium-rich alloys, containing 7.74; 10.50; 16.80; 20.90; 33.73 and 51.64 atomic % Hf (62.5; 70.0; 80.0; 84.0; 91.0 and 95.5 weight %) were prepared in an arc furnace with a water-cooled copper hearth and an insoluble tungsten electrode, under argon (300 - 400 mm Hg pressure). The alloys were not subjected to heat treatment. X-ray investigation of the alloys was carried out by the powder method in a Debye camera (57.3 mm diameter) and in a Preston camera with chromium irradiation. The following properties were determined for a few alloys; melting point, hardness, microstructure and microhardness of the structural components. The melting point was determined in argon (400 mm Hg pressure) by the drop method, in which a hole drilled in the specimen is filled with the molten metal and the temperature determined by means of an optical pyrometer, calibrated with reference to the pure metals under identical conditions. The hardness was measured in a Rockwell machine according to scale B (2.5 mm diameter ball, 100 kg load), the microhardness was

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D217/D306

Hafnium-beryllium compounds...

measured with a PMT-3 machine (100 gram load). The existence of the following 4 compounds was established: $HfBe_2$. $AlB_2$ type, a = 3.775 ± 0.002, c = 3.157 ± 0.001 kX, c/a = 0.836; $H_{\mu}$ = 980 kg/mm$^2$; $HfBe_5$, $CaZn_5$ type, a = 4.525 ± 0.010, c = 3.464 ± 0.010 kX, c/a = 0.765; $H_{\mu}$ = 1340 kg/mm$^2$; $Hf_2Be_{17}$, $U_2Zn_{17}$ type, a = = 7.484 ± 0.002, c = 21.861 ± 0.006 kX, c/a = 2.921; $H_{\mu}$ = 1085 kg/mm$^2$; $HfBe_{13}$, $NaZn_{13}$ type, a = 9.985 ± 0.002 kX; $H_{\mu}$ = 1200 kg/mm$^2$. There are 10 tables, 1 figure and 19 references: 5 Soviet-bloc and 14 non-Soviet-bloc. The references to the 4 most recent English-language references are: J.W. Nielsen, N.C. Baenziger, Acta Crystallogra, 7, 132 (1954). A. Zalkin, R.G. Bedford, D.E. Sands. Acta Crystallogra, 12, 9, 700 (1959). R.P. Elliott, W. Rostoker, Trans. Amer. Soc. Metals, 50, 617 (1958). J.F. Smith, D.M. Bailey. Acta Crystallogra, 10, 4, 341 (1957)/

ASSOCIATION: L'vovskiy gosudarstvenyy universitet im Iv. Franko. (L'vov State University im. I.V. Franko); Institut

Card 3/4

24938

Hafnium-beryllium compounds... S/192/61/002/004/001/004
D217/D306

metallurgii im. A.A. Baykova AN SSSR (Institute of Metallurgy im. A.A. Baykov, AS USSR)

SUBMITTED: July 5, 1960

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18.9200

[illegible]

AUTHORS: Tyl'kina, M. A., Polyakova, V. P., Savitskiy, Ye. M.

TITLE: Phase diagram of the palladium - tungsten system

PERIODICAL: Zhurnal neorganicheskoy khimii, [illegible], no. 6, 196[illegible], 147[illegible]-1474

TEXT: Publications only contain data on the formation of solid solutions of 22.6% by weight of tungsten in palladium and the absence of chemical compositions of both elements. The phase diagram (Fig. 1) of the palladium - tungsten system was drawn by determination of the fusing temperature, microscopic and X-ray phase analyses, measurements of hardness and microhardness of the phases as well as of the absolute thermo-emf. The initial substances of 99.95% Pd powder and 99.8% W powder were mixed, briquetted and sintered at 1500°C and $10^{-3}$ mm Hg, and then melted in the arc furnace in purified argon atmosphere. The fusing temperature was determined according to Ye. M. Savitskiy (Ref. 3: Zh. neorgan. khimii, 3, 815 (1958)) by the drop method in vacuum and with an optical pyrometer. For the phase analysis the alloys were annealed at $10^{-3}$ mm Hg for 6 hr at 1500°C and for 400 hr at 1000°C, and then cooled

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[illegible]

S/078/[illegible]/006/006/010/015
Phase diagram of the palladium - tungsten ... B110/B106

by air. The X-ray investigation was made with Cu - $K_\alpha$ emission in the chamber of the type [illegible] (RKD) [illegible]. For the microscopic analysis, alloys with high Pd content were etched with [illegible] ml [illegible]% HCl and [illegible] 3 drops $H_2O$, alloys with high W content with a mixture of [illegible] parts of [illegible]% $K_4Fe(CN)_6$ and [illegible] part of 10% KOH. The hardness was investigated in the Vickers apparatus with [illegible] kg, the microhardness of the phases in the [illegible]-3 (PMT-3) apparatus with 50 g and 20 g load. The absolute thermo-emf was determined according to A. A. Rudnitskiy (Ref. 4. Termoelektricheskiye svoystva blagorodnykh metallov i ikh splavov. Izd-vo AN SSSR Moskva 1956). Fig. 1a shows the phase diagram Pd-W, 1 b,c the diagrams composition - properties. The diagram of the system Pd-W is peritectic ([illegible] + β ⇌ α) [illegible] with two limited zones of solid solutions. Microstructure- and X-ray analyses produced monophase structure of the solid solution with face-centered cubes with lattice parameters (similar to Pd) of all alloys ≤ 25% by weight W. The alloy with 25% by weight W is a monophase solid solution at ≥ 1500°C; a second phase precipitates at lower temperatures. The fusing temperature of solid α-solutions rises from the palladium fusing point of 1552°C up to 2100°C for an alloy with 25% by weight W. The

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23004

S/078/61/006/006/010/013
B110/B206

Phase diagram of the palladium - tungsten ...

absolute thermo-emf of the solid α-solution changes sinusoidally. On the basis of tungsten, the zone of the monophase solid β-solution is much narrower. It amounts to 2% by weight Pd in the fusing point vicinity and drops to 1.6% by weight at 1500°C. In the cast state, the alloy with 98% by weight W shows a monophase solid solution. After quenching from 1500 and 1000°C, a second phase appears, which increases with decreasing temperature. Cubic W structure was determined for this phase by X-ray analysis. The α + β-diphase zone lying between the α- and β-zone clearly showed primary gray dendrite crystals of the solid β-solution, which were surrounded by the lighter α-solution. The β-portion rises with an increase of tungsten and the α-crystals only remain as narrow veins at the grain boundaries of the β-crystals. The microstrength of the α-solution amounted to about 220 kg/mm², that of the β-solution to about 440 kg/mm². The curve of the absolute thermo-emf, almost horizontal in the diphase region, dropped considerably at the transition to the region of the β-solution. The alloys in the region of the solid tungsten- and palladium solutions can be well shaped by cold processing, so that they may be used as potentiometric and corrosion-resistant materials. The authors thank Ye. N. Kunenkova for her collaboration. There are 2 figures, 1 table,

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23084

S/078/61/006/006/010/013

Phase diagram of the palladium - tungsten ... B110/B206

and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: December 23, 1960

Fig. 1: Diagram (a - g) of the phase and property of the palladium - tungsten system. Legend: 1) microhardness in kg/mm$^2$; 2) tempered at 1000°C; 3) cast; 4) W content in % by weight

(For Fig. 1 see Card 6/6

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23085

S/078/61/006/006/011/013
B110/B206

18.9200 1454, 1555, 1418

AUTHORS: Savitskiy, Ye. M., Tylkina, M. A., Kirilenko, P. V., Kopetskiy, Ch. V.

TITLE: The phase diagram of the manganese - rhenium system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 6, 1961, 1474-1476

TEXT: Since only provisional data are available on the manganese - rhenium system, the latter was checked by micro- and X-ray structural analysis, thermal analysis and investigation of the microhardness of the phases. Part of the results is given in the phase diagram (Fig. 1). Since the fusing point of rhenium at 3160°C lies much higher than the boiling point of manganese at 2090°C, Mn-Re alloys could only be melted up to 30 atom % Re in the vacuum induction furnace in Ar atmosphere. Electrolytic manganese (99.83%) and pressed rhenium powder (99.8%) sintered at 1500°C served as initial substances. Alloys with 0.2; 0.3; 0.5; 1.87; 2.64; 3.1; 5.56; 9.65; 10.72; 17.05; 20.42; 22.9 and 32.1 atom % rhenium content were investigated. Hardening was done at 950°C for 100 hr. It was established by microstructural analyses that α-Mn dissolves up to

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The phase diagram of the ... S/078/61/006/006/011/013
B110/B206

5.5 atom % Re. From this content on, the structure of the alloy is a diphase one. The σ-phase (52.24 atom % Re) forming during the peritectic reaction is separated dendritically and increases with increasing rhenium content. The radiographs, the results of which coincide with those of the microstructural analysis, were taken in the РКУ (RKU) and РКД (RKD chambers with $CrK_{\alpha}$ - and $V\ K_{\alpha}$ emissions. The structure of the solid solution is that of α-manganese. The parameter of its crystal lattice changed from 8.894 kX (pure Mn) to 8.924 kX at a 5.56 atom % Re content and then remains constant. From about 9.5 atom % Re, interferences of the σ-phase which increase with increasing Re concentration can be observed. The parameters of the crystal lattice of the α-phase with 22.9 atom % Re are: a = 9.11 kX; c = 4.92 kX; c/a = 0.54. No β-Mn interferences were established. The thermal analysis was made with the W-Re thermocouple ВР 5/20 (VR 5/20) according to the method described by the first author: Dokl. AN SSSR, 129, 559 (1959). It was established that rhenium admixtures > 5.54 atom % lead to the increase of all temperatures of the polymorphous transitions and the fusing temperature of Mn-Re. The temperature of formation of the σ-phase (presumably < 1700°C) could not be determined. The analogous metals of the VIIth

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S/078/61/006/006/011/013
B110/B206

The phase diagram of the ...

group of the periodic system rhenium and manganese form, against the rule, no continuous series of solid solutions. The σ-phase forms at 52.24 atom % Re content, the range of solid solutions only goes up to 5.5 atom % Re content. This probably produces the relationship of the α- and β-modifications of Mn forming at low temperatures, with the intermetallic compounds (χ- and ... phases) on the basis of its interatomic bond type, the crystalline and physical properties. In contrast to Ti, Zr, Nb and Ta, rhenium is soluble in α-Mn up to 5.5 atom %, and the structure of the β-modification is not undercooled. This confirms the favorable value of the size factor of Re as a cause for its solubility. There are 2 figures and 4 Soviet-bloc references.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Metallurgical Institute imeni A. A. Baykov, AS USSR)

SUBMITTED: November 9, 1960

Card 3/4

89639

18.1150

S/509/60/000/004/019/024
E021/E106

AUTHORS: Savitskiy, Ye.M., Tylkina, M.A., Ipatova, S.I., and Pavlova, Ye.I.

TITLE: Physico-Mechanical Properties of Tungsten and Rhenium

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii. Trudy, No.4, 1960. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya, pp.214-229

TEXT: Rhenium has been suggested as a possible alternative for tungsten for use in the electro-vacuum industry, but it is very expensive. Therefore an investigation of tungsten-rhenium alloys was carried out. Alloys were prepared in an arc furnace and by powder metallurgical methods. The complete range of alloys was studied by metallographic and X-ray analysis, by micro-hardness measurements and by measuring melting points. The formation of the compound $W_2Re_3$ ($\sigma$ phase) in the region 48-65 wt.% rhenium and the formation of a eutectic between the $\sigma$ phase and the rhenium solid solution at 75 wt.% rhenium and 2815 °C were confirmed. No eutectic between $W_2Re_3$ and tungsten was found.

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S/509/60/000/004/019/024
E021/E106

Physico-Mechanical Properties of Tungsten and Rhenium

There was a wide range of solid solutions of rhenium in tungsten (up to 30%) at high temperatures, with decreasing solubility as the temperature was decreased. The compound $W_2Re_3$ formed by a peritectic reaction possessed a high hardness (about 2000 kg/mm$^2$) and was brittle. A method was developed for preparing wire of diameter 12 microns from alloys with a maximum rhenium content of 20 wt.%. The wire was prepared by hot-working samples prepared by powder metallurgical methods. The introduction of rhenium into tungsten raised the temperature of the beginning of recrystallization by 200-400 °C depending on the rhenium content. Grain growth of tungsten-rhenium alloys was less intensive than that of tungsten. The tungsten-rhenium alloys retained a high strength and possessed considerable ductility after annealing at 1400-1950 °C. The initial strength of 100 micron tungsten wire was 320 kg/mm$^2$ with an elongation of 1-5%. After heating at 1950 °C the strength decreased to 80 kg/mm$^2$, and elongation was 0. The alloy containing 21% rhenium in these conditions decreased in strength from 370 to 150 kg/mm$^2$ and the elongation increased from
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E021/E106

Physico-Mechanical Properties of Tungsten and Rhenium

1.5 to 6-8%. After annealing at 1400-1500 °C, the strength of this alloy was 180-190 kg/mm$^2$ and its elongation 18-20%. The strength of wires of the alloys was higher than that of tungsten wires at all temperatures, although an increase in temperature resulted in a decrease in strength. At 1400 °C the U.T.S. of tungsten was 42 kg/mm$^2$ and that of an alloy containing 19% rhenium was 66.7 kg/mm$^2$. At 2600 °C the figures were 4 and 6.7 kg/mm$^2$ respectively. The limiting testing temperature of alloys containing 10 and 20% rhenium was 3000 °C, or 300° higher than the limiting temperature of tungsten or alloys containing 1 and 3% rhenium. The hardness of cast tungsten-rhenium alloys was tested in the range 20-1000 °C. At 800 °C alloys containing 10, 25 and 75% rhenium and pure rhenium had a hardness of about 200 kg/mm$^2$. Tungsten and alloys containing 10% rhenium had a hardness of 100 kg/mm$^2$. The electrical resistance of 50-micron wires of the alloys was measured at 20 to 1350 °C. At any given temperature the resistance was higher with higher rhenium contents.

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89539

S/509/60/000/004/019/024
E021/E106

Physico-Mechanical Properties of Tungsten and Rhenium

At 20 °C the resistance of tungsten was 0.056 ohm.mm$^2$/m, and that of the alloy containing 21% rhenium was 0.242 ohm.mm$^2$/m. At 1600 °C the resistances were 0.44 and 0.644 ohm.mm$^2$/m respectively. Thus the tungsten-rhenium alloys possessed several advantages over tungsten.
There are 11 figures and 23 references: 19 Soviet and 4 English.

Card 4/4

GLADYSHEVSKIY, Ye.I.; TYLKINA, M.A.; SAVITSKIY, Ye.M.

X-ray and microscopic analysis of Hf-Re alloys. Kristallografiia 5 no.6:877-881 N-D '60. (MIRA 13:12)

1. L'vovskiy gosudarstvennyy universitet imeni I. Franko i Institut metallurgii imeni A.A. Baykova AN SSSR.
(Hafnium-rhenium alloys--Spectra)

20025

189200 1418, 1145, 1454, 1045 S/070/61/006/001/003/011
E032/E514

AUTHORS: Kripyakevich, P. I., Tylkina, M.A. and Savitskiy, Ye.M.

TITLE: Crystal Structures of Hafnium-Beryllium Compounds (A Preliminary Communication)

PERIODICAL: Kristallografiya, 1961, Vol.6, No.1, pp.117-118

TEXT: It is stated that the hafnium-beryllium system has not so far been investigated. The alloys prepared by the present authors contained 0.05, 0.1, 0.25, 0.5, 2.0, 10.0, 20.0, 33.0, 62.5, 70.0, 80.0, 84.0, 91.0 and 95.5% by weight of hafnium. The alloys were prepared by alloying hafnium and beryllium in an argon atmosphere in a high frequency or an arc furnace. The specimens were then subjected to X-ray analysis. For some alloys the melting point, the hardness and the microhardness of the structural components were determined. The microhardness $H_\mu$ was determined with a load of 100 g to within $\pm 30$ kg/mm$^2$ using a ПМТ-3 (PMT-3) device. It was found that the following four compounds are present in the system:

1) $HfBe_2$, structural type $AlB_2$, sp.gr. $C6/mmm - D^1_{6h}$, $a = 3.783 \pm 0.002$, $c = 3.163 \pm 0.001$Å, $c/a = 0.836$, $H_\mu = 980$ kg/mm$^2$;

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X

20025

Crystal Structures of ..... S/070/61/006/001/003/011
E032/E514

2) $HfBe_5$, type $CaZn_5$, sp.gr. C6/mmm - $D^1_{6h}$, a = 4.534±0.010, c = 3.471±0.010 Å, c/a = 0.765, $H_\mu$ = 1340 kg/mm$^2$;

3) $Hf_2Be_{17}$, type $U_2Zn_{17}$, sp.gr. C6m2 - $D^1_{3h}$, a = 7.499±0.002, c = 21.905±0.006 Å, c/a = 2.921, $H_\mu$ = 1085 kg/mm$^2$;

4) $HfBe_{13}$, type $NaZn_{13}$, sp.gr. Fm3c - $O^6_h$, a = 10.005±0.002 Å, $H_\mu$ = 1200 kg/mm$^2$.

Thus, the Hf-Be system is close to the Zr-Be system from the crystal-chemical point of view. The latter also includes four compounds which are isostructural with the above compounds (N. C. Baenzinger, R. E. Rundle, Ref.2; J. W. Nielsen, N.C.Baenziger, Ref.3; A. Zalkin, R. C. Bedford, D. E. Sands, Ref.4). There are 4 references: all non-Soviet.

ASSOCIATIONS: L'vovskiy gosudarstvennyy universitet im. I.Franko (L'vov State University imeni I. Franko); Institut metallurgii im. A. A. Baykova AN SSSR (Institute of Metallurgy imeni A.A.Baykov AS USSR)

SUBMITTED: May 3, 1960

Card 2/2

TYLKO, A.

Winter and its influence on the construction of overhead telecommunication lines.

P. 25. (PRZEGLAD KOLEJOWY ELEKTROTECHNICZNY) (Warszawa, Poland) Vol. 9, no. 2, Feb. 1957

SO: Monthly Index of East European Accession (EEAI) LC Vol. 7, No. 5, 1958

TYLKO, Antoni (Stargard Szczecinski)

In noble competition the Western Pomeranian Province has been victor in the service of traffic safety and communication among the networks of the Polish State Railroads. Przegl kolej elektrotech 10 [i.e.15] no.11:334-335 N'63.

TYLKO, Antoni

Interbranch labor competition in the services of the Safety Administration for Traffic and Communication. Przegl kolej elektrotech 15 no.7:207-208, 3 of cover Jl '63.

1. Dyrekcja Okregowa Kolei Panstwowych, Szczecin.

TYLL, Jerzy, mgr inz.

Second Conference of the Council for Economic Mutual Assistance on the development of fishing fleets. Tech gosp 15 no.3:95-98 Mr '65.

1. Committee for Science and Technology, Warsaw.

TYLL, Ladislav

Keratosis pilaris rubra faciei (Brocq), ulerythema ofryogenes (Taenzer-Unna); folliculitis rubra (Wilson). Cesk. derm. 36 no.1: 55-56 F '62.

1. Kozni oddeleni OUNZ Pisek, prednosta MUDr., Ladislav Tyll.
(ERYTHEMA) (KERATOSIS) (FOLLICULITIS)

TYLL-JUNGOWSKA, Teresa; ZEGARSKI, Witold.

Diagnostic difficulties in tumors of the large intestine. Polskie arch. med. wewn. 27 no.5:631-642 1957.

1. Z I Kliniki Chorob Wewnetrznych A. M. G. Kierownik: prof. dr med. M. Gorski. Adres autora: Gdansk, I Klinka Chorob Wewn A. M.
(INTESTINE, LARGE, neoplasms,
diag. difficulties (Pol))

TYLL-ZAJACZKOWSKA, Wanda (Warszawa, ul. Spasowskiego 13 m 5)

Case of Poncet's tuberculous rheumatism. Polski tygod. lek. 9 no.45:1457-1459 8 Nov 54.

1. Z Oddzialu Wewnetrznego doc. dr med. B.Jochwedsa.
(TUBERCULOSIS, OSTEOARTICULAR,
rheum. tuberc.)

CZECHOSLOVAKIA/Cultivated Plants - Ornamental. M

Abs Jour : Ref Zhur Biol., No 12, 1958, 53910

Author : Tyller, Zdenek
Inst : -
Title : Gentiana asclepiadea in Horticulture

Orig Pub : Ziva, 1957, 5, No 5, 177

Abstract : No abstract.

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